From Electronic Documentation to Evidence Based Nursing: Creating Data Marts for Analysis, Evaluation and Improvement of Processes in Patient Care

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Abstract and Objective

The nursing documentation system in the Tyrolean federal hospitals produces an enormous amount of highly structured nursing data. We built an extensible data mart aggregating these data in combination with information on the patients' medical history and current living conditions. Using the workflow-based application KD³ it is possible to easily explore, visualize and evaluate the data in order to reach our goal: finding new knowledge supporting evidence based, quality assured patient care.

Keywords:

Nursing informatics, Evidence based nursing, Nursing care management, Data marts, Knowledge discovery in databases

Introduction

A comprehensive electronic nursing documentation system has been established over the last years in the hospitals of TILAK (Tyrolean federal hospitals). This system covers all phases of the nursing process and therefore produces an enormous amount of highly structured data. In the past these data had been used basically for patient care and documentation purposes. In order to be able to access the information and potential knowledge for quality management issues hidden in these data we built a system that allows creating, querying, exploring and mining data marts in a comfortable, workflow based way.

Methods

The TILAK hospitals use Cerner Millennium as core component of their Clinical Information System (CIS). The nursing documentation system is realized as part of Cerner Millennium. A data extraction routine exports the nursing data periodically from CIS databases into CSV files. After data cleaning steps these files are transformed and loaded into the database scheme of the nursing data mart which was designed according to the needs of the nursing management board. Central element in this mart is the patient stay table providing a unique patient stay-id and the relating patient-id. The cleaning, transformation and load processes are realized using KD³ (Knowledge Discovery in Databases Designer), an in-house developed, workflow based java tool in combination with Talend Open Studio and PostgreSQL as data base.

KD³ furthermore supports database queries with an integrated graphical query designer, statistical and data mining methods and provides data export as well as data visualization functionality. New functionality can easily be added to KD³ due to its plug-in based design.

Results

Up to now a stable version of a data model for the data mart has been established and workflows for extracting, cleaning, transformation and loading of the nursing data have been implemented and tested. The nursing data mart contains data from all phases of the nursing process including NANDA-I nursing diagnoses, interventions, outcome and detailed information on the medical history and current living conditions of the patients. It is facile to expand and adapt the data mart to future needs due to the unique patient stay-id that is contained in all CIS datasets. At the moment we have built the first queries to test the feasibility of our approach. Here are some examples of questions we try to answer by querying the data mart: Which NANDA-I diagnoses are how often used in which clinical departments? Which nursing interventions are planned for which goals? Which interventions are efficient under which conditions? Which are not efficient? What is the degree of performance of the different interventions, etc.?

Conclusion

We have built a data mart for nursing data with the aim to learn if and how we can improve processes in patient care. Exploring the information hidden in the aggregated data we try to learn how we can assess, measure and in succession improve the quality of the different steps of the nursing process.

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